

# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND



XMIT 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Block - DC	Fairview Microwave	SD3379	AMT	2021-09-14	2022-09-14
Receiver	Rohde & Schwarz	ESR26	ARQ	2021-05-11	2022-05-11

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum of the average spectrum does not exceed the rule part defined limit.

The PAPR measurement method is described in ANSI C63.26 section 5.2.3.4.  
The PAPR was measured using the CCDF function of the spectrum analyzer.

Per FCC part 24.232(d) and RSS 133 6.4, the PAPR limit shall not exceed 13 dB for more than the ANSI described 0.1% of the time.


Per FCC part 27.50(d)(5), RSS-139 6.5, and RSS-170 5.3.1, the peak-to-average power ratio (PAPR) shall not exceed 13dB.

RF conducted emissions testing was performed only on one port. All four AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND



Tel: 2021.12.14.1 XM: 2022.02.07.0

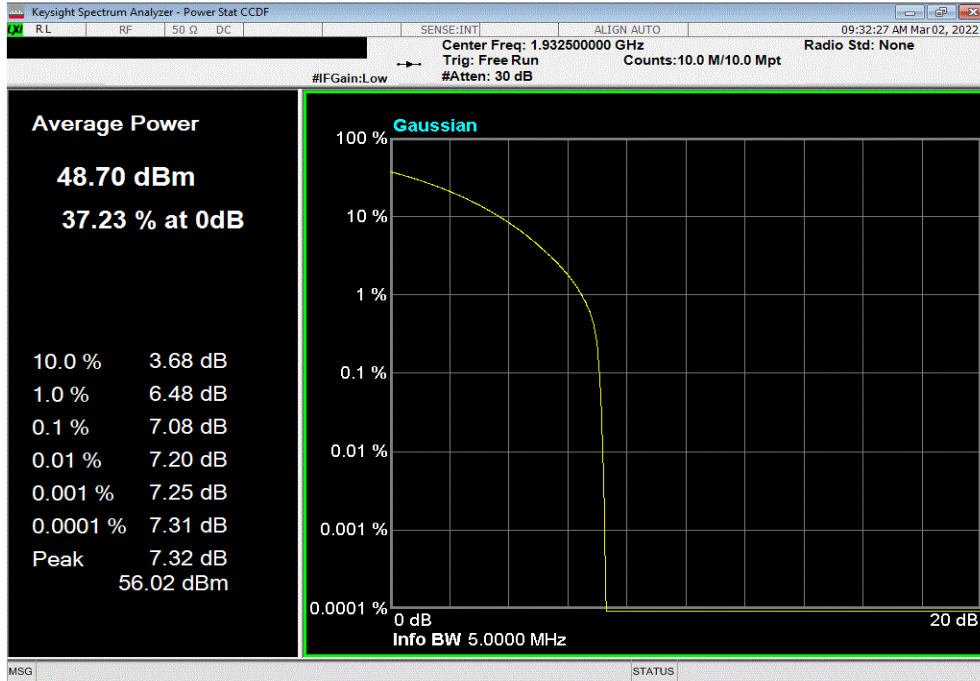
EUT: AHFII Remote Radio Head		Work Order: NOKI0037	
Serial Number: YK214000036		Date: 28-Feb-22	
Customer: Nokia Solutions and Networks		Temperature: 22.6 °C	
Attendees: David Le, John Rattanavong		Humidity: 23.7% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Mark Baytan		Power: 54 VDC	
Job Site: TX09			
<b>TEST SPECIFICATIONS</b>			
FCC 24E:2022		Test Method	
RSS-133 Issue 6:2013+A1:2018		ANSI C63.26:2015	
		RSS-133 Issue 6:2013+A1:2018	
<b>COMMENTS</b>			
All measurement path losses accounted for in the reference level offset including any attenuators, filters, and DC blocks. Band 25 carriers enabled at maximum power is 80 watts/carrier.			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	2	Signature 	
		PAPR Value (dB)	PAPR Limit (dB) Results
Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band			
Port 1			
5 MHz Bandwidth			
E-TM1.1 with N-TM			
	Low Channel, 1932.5 MHz	7.08	13 Pass
	Mid Channel, 1962.5 MHz	7.06	13 Pass
	High Channel, 1992.5 MHz	7.04	13 Pass
10 MHz Bandwidth			
E-TM1.1 with N-TM			
	Low Channel, 1935 MHz	7.20	13 Pass
	Mid Channel, 1962.5 MHz	7.13	13 Pass
	High Channel, 1990 MHz	7.16	13 Pass
15 MHz Bandwidth			
E-TM1.1 with N-TM			
	Low Channel, 1937.5 MHz	7.28	13 Pass
	Mid Channel, 1962.5 MHz	7.14	13 Pass
	High Channel, 1987.5 MHz	7.19	13 Pass
20 MHz Bandwidth			
E-TM1.1 with N-TM			
	Low Channel, 1940 MHz	7.35	13 Pass
	Mid Channel, 1962.5 MHz	7.13	13 Pass
	High Channel, 1985 MHz	7.20	13 Pass

# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND

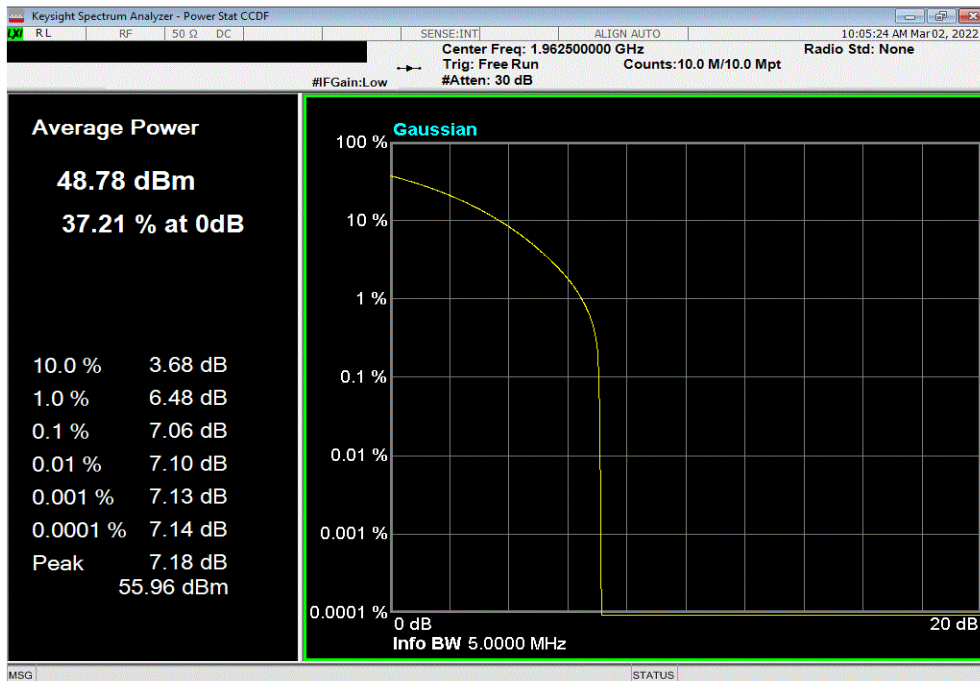


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 5 MHz Bandwidth, E-TM1.1 with N-TM, Low Channel, 1932.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.08	13	Pass			



Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 5 MHz Bandwidth, E-TM1.1 with N-TM, Mid Channel, 1962.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.06	13	Pass			

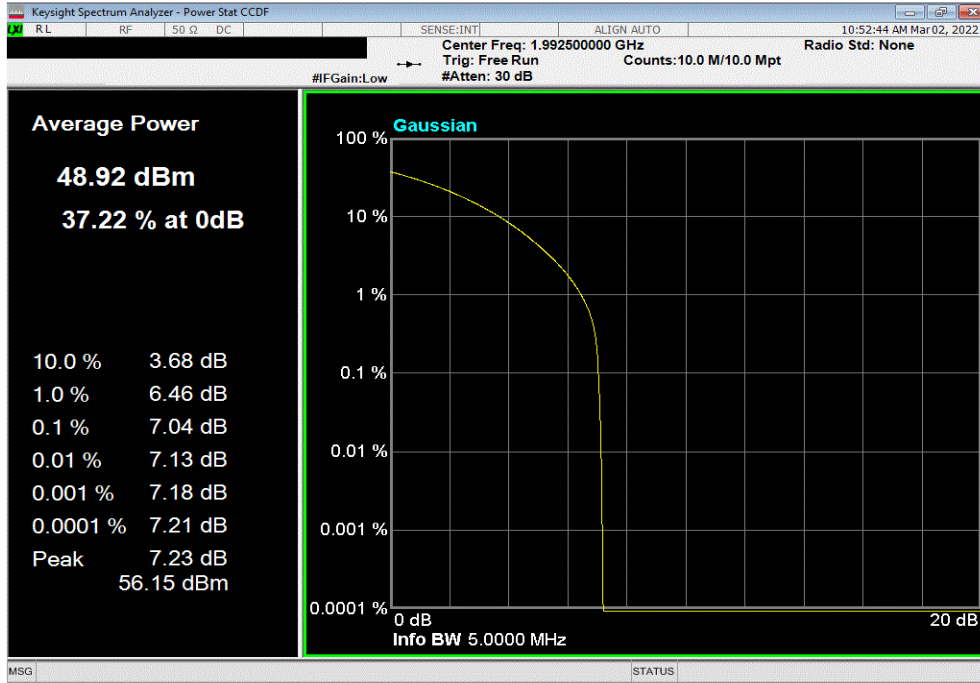


# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND

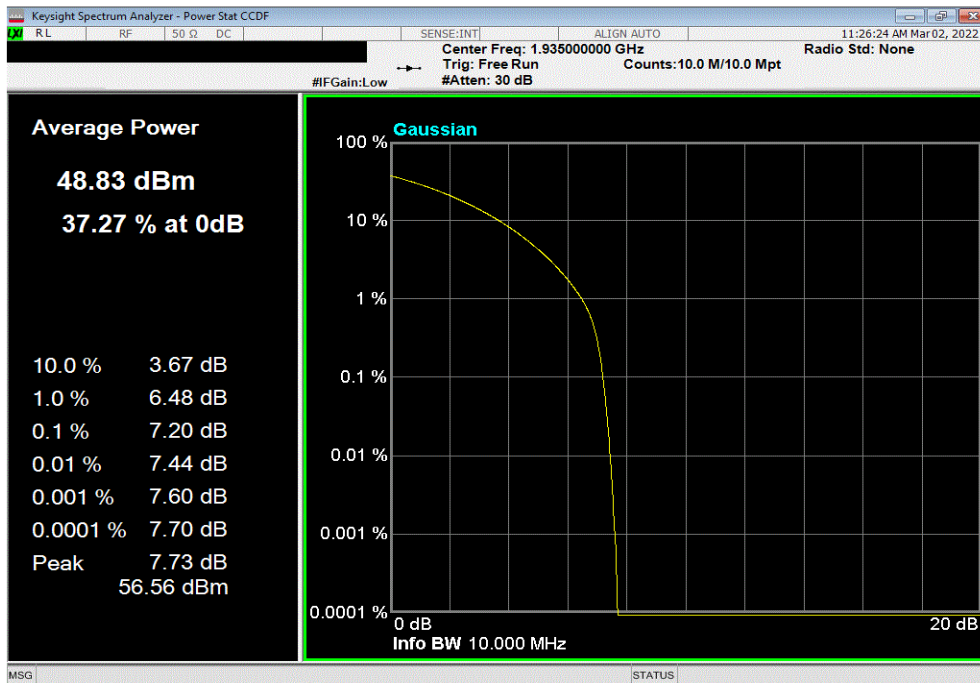


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 5 MHz Bandwidth, E-TM1.1 with N-TM, High Channel, 1992.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.04	13	Pass			



Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 10 MHz Bandwidth, E-TM1.1 with N-TM, Low Channel, 1935 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.20	13	Pass			

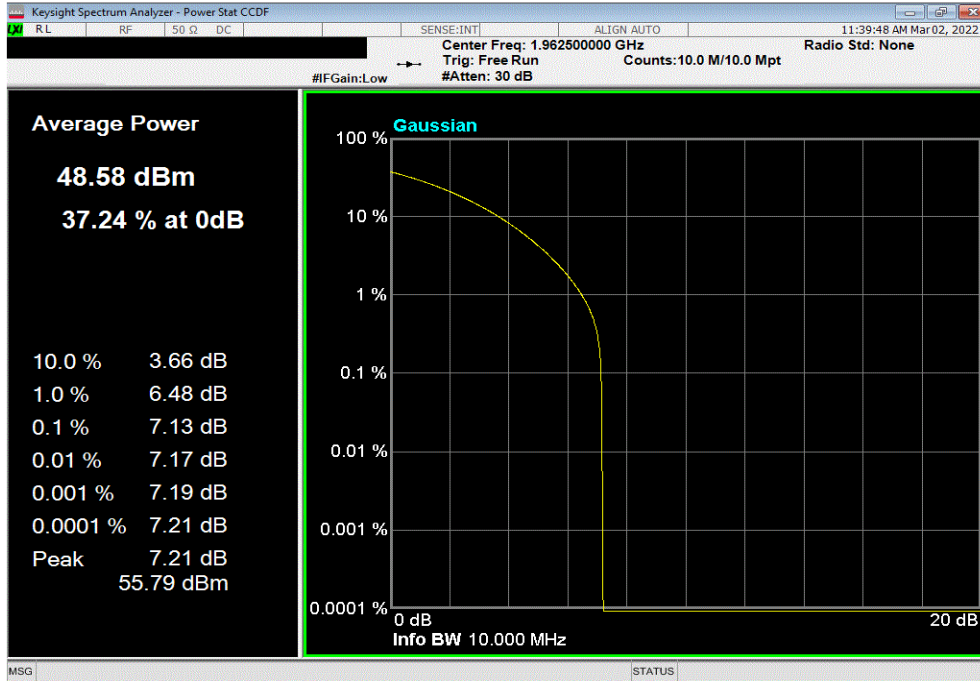


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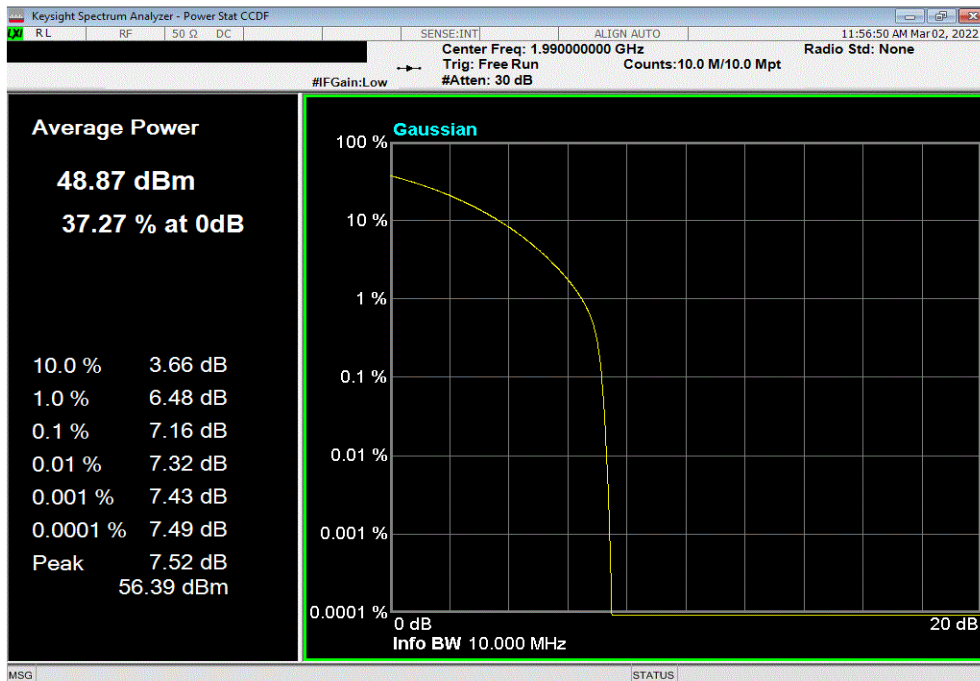


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 10 MHz Bandwidth, E-TM1.1 with N-TM, Mid Channel, 1962.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.13	13	Pass			



Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 10 MHz Bandwidth, E-TM1.1 with N-TM, High Channel, 1990 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.16	13	Pass			

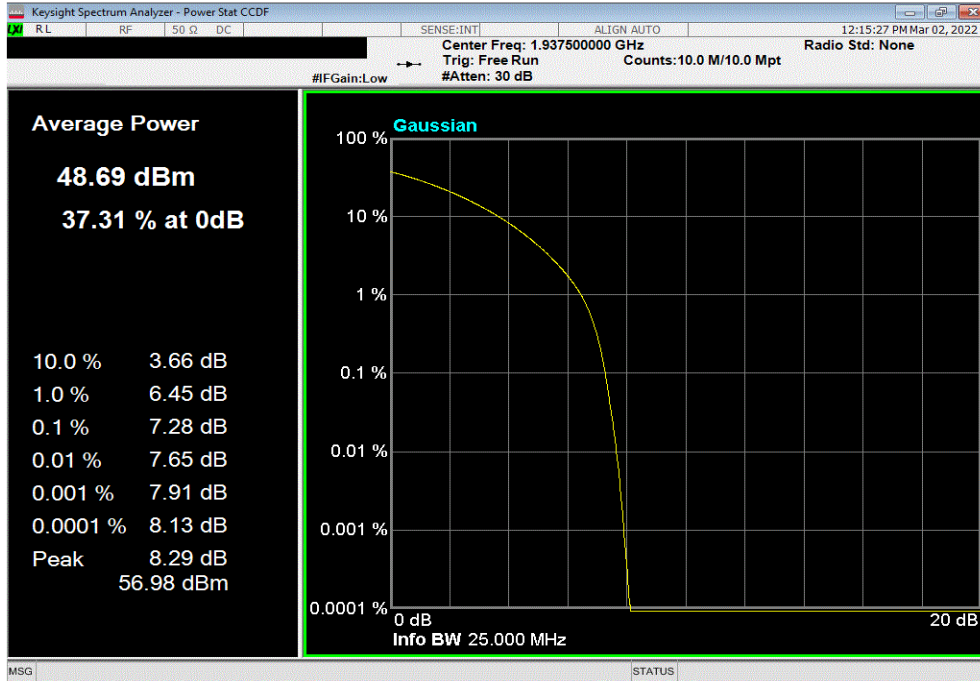


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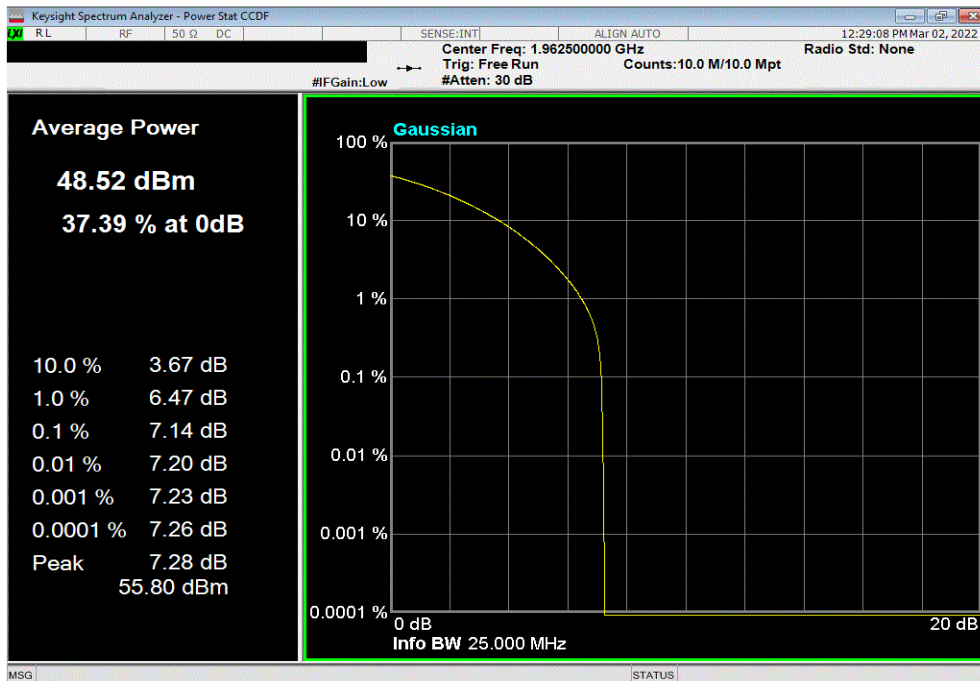


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 15 MHz Bandwidth, E-TM1.1 with N-TM, Low Channel, 1937.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.28	13	Pass			



Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 15 MHz Bandwidth, E-TM1.1 with N-TM, Mid Channel, 1962.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.14	13	Pass			

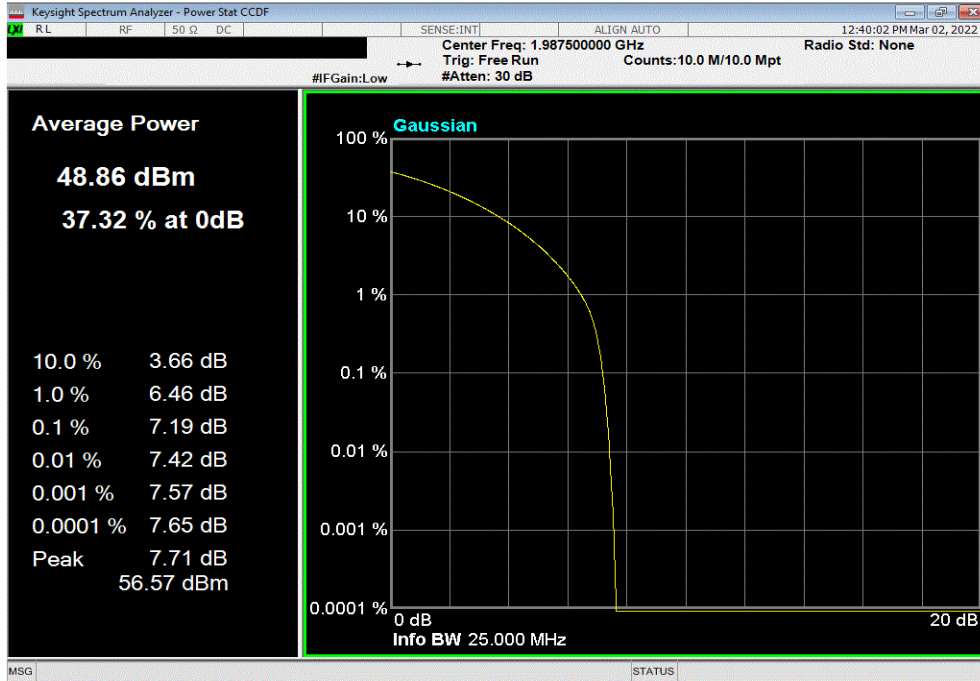


# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND

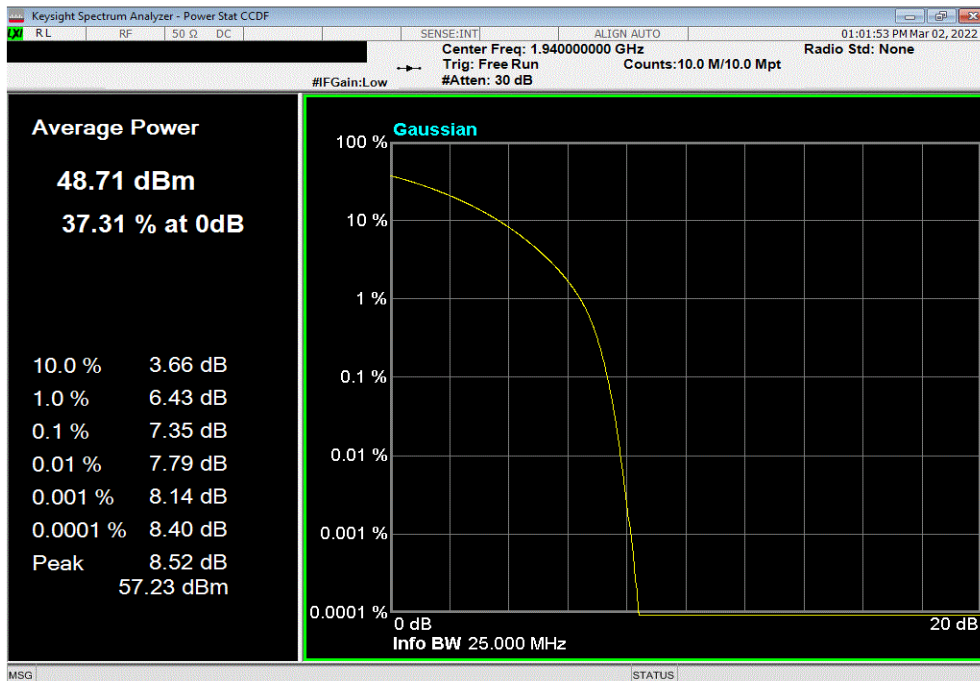


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 15 MHz Bandwidth, E-TM1.1 with N-TM, High Channel, 1987.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.19	13	Pass			



Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 20 MHz Bandwidth, E-TM1.1 with N-TM, Low Channel, 1940 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.35	13	Pass			

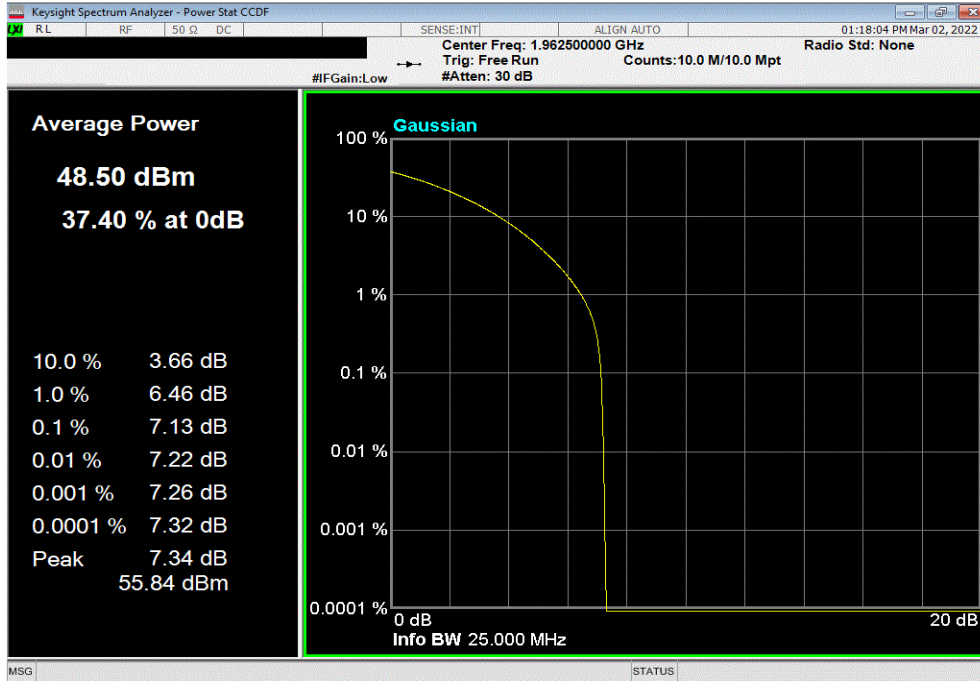


# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND

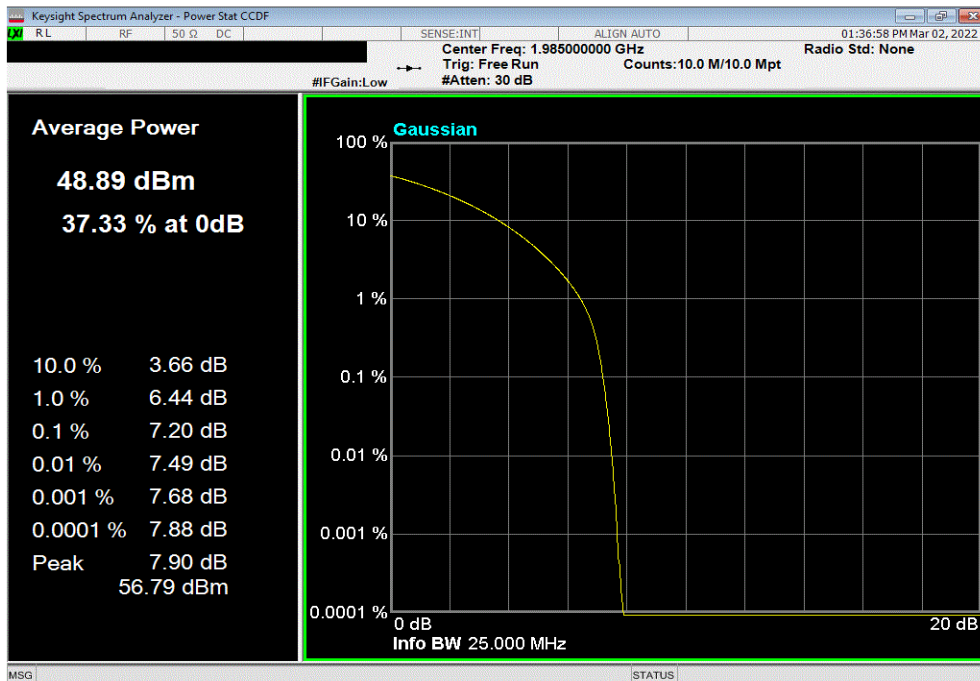


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 20 MHz Bandwidth, E-TM1.1 with N-TM, Mid Channel, 1962.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.13	13	Pass			



Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT In-Band, Port 1, 20 MHz Bandwidth, E-TM1.1 with N-TM, High Channel, 1985 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.20	13	Pass			






# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND



Tel: 2021.12.14.1 XM: 2022.02.07.0

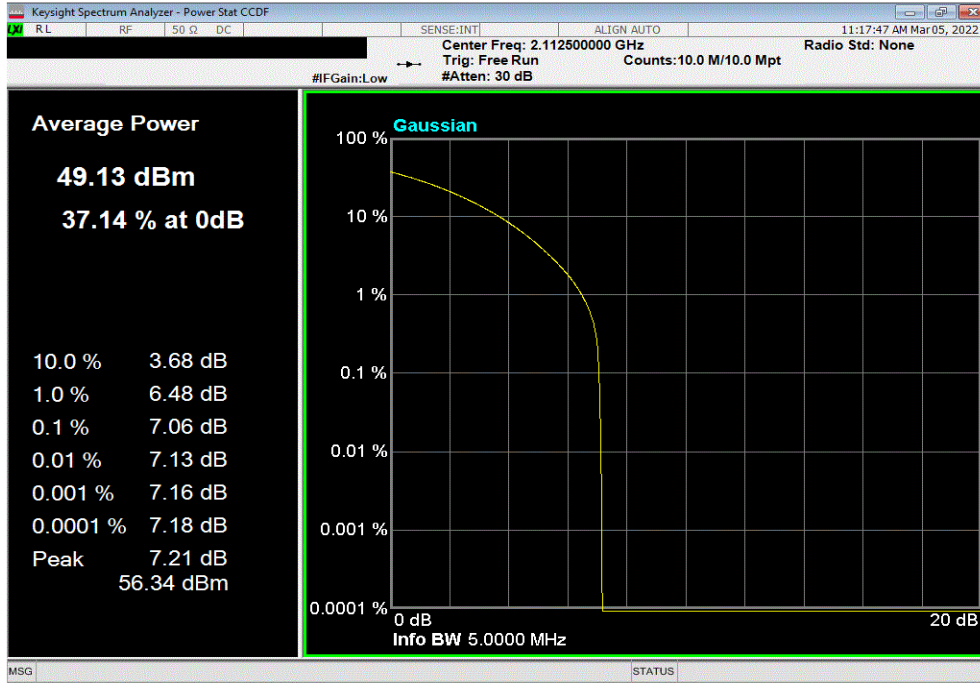
EUT: AHFII Remote Radio Head		Work Order: NOKI0037		
Serial Number: YK214000036		Date: 28-Feb-22		
Customer: Nokia Solutions and Networks		Temperature: 22.6 °C		
Attendees: David Le, John Rattanavong		Humidity: 23.7% RH		
Project: None		Barometric Pres.: 1026 mbar		
Tested by: Mark Baytan	Power: 54 VDC	Job Site: TX09		
<b>TEST SPECIFICATIONS</b>				
FCC 27:2022		Test Method		
RSS-139 Issue 3:2015		ANSI C63.26:2015		
RSS-170 Issue 3:2015		RSS-139 Issue 3:2015		
		RSS-170 Issue 3:2015		
<b>COMMENTS</b>				
All measurement path losses accounted for in the reference level offset including any attenuators, filters, and DC blocks. Band 66 carriers enabled at maximum power is 80 watts/carrier.				
<b>DEVIATIONS FROM TEST STANDARD</b>				
None				
Configuration #	2	Signature 		
		PAPR Value (dB)	PAPR Limit (dB)	Results
Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band				
Port 1				
5 MHz Bandwidth				
E-TM1.1 with N-TM				
Low Channel, 2112.5 MHz		7.06	13	Pass
Mid Channel, 2155 MHz		7.06	13	Pass
High Channel, 2197.5 MHz		7.06	13	Pass
10 MHz Bandwidth				
E-TM1.1 with N-TM				
Low Channel, 2115 MHz		7.15	13	Pass
Mid Channel, 2155 MHz		7.13	13	Pass
High Channel, 2195 MHz		7.15	13	Pass
15 MHz Bandwidth				
E-TM1.1 with N-TM				
Low Channel, 2117.5 MHz		7.17	13	Pass
Mid Channel, 2155 MHz		7.14	13	Pass
High Channel, 2192.5 MHz		7.17	13	Pass
20 MHz Bandwidth				
E-TM1.1 with N-TM				
Low Channel, 2120 MHz		7.18	13	Pass
Mid Channel, 2155 MHz		7.13	13	Pass
High Channel, 2190 MHz		7.16	13	Pass

# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND

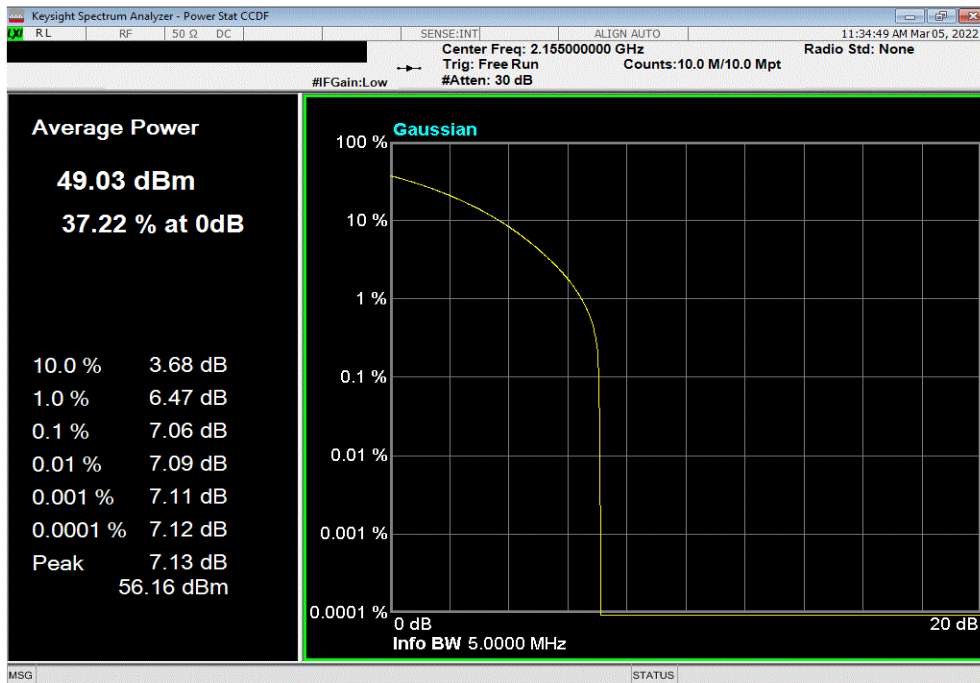


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 5 MHz Bandwidth, E-TM1.1 with N-TM, Low Channel, 2112.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.06	13	Pass			



Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 5 MHz Bandwidth, E-TM1.1 with N-TM, Mid Channel, 2155 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.06	13	Pass			

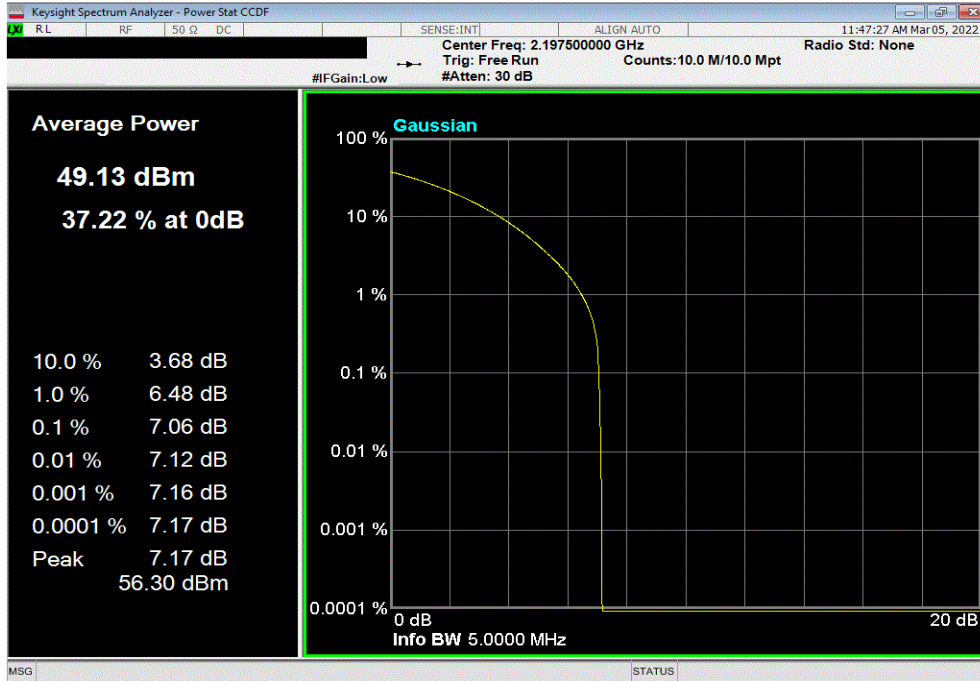


# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND

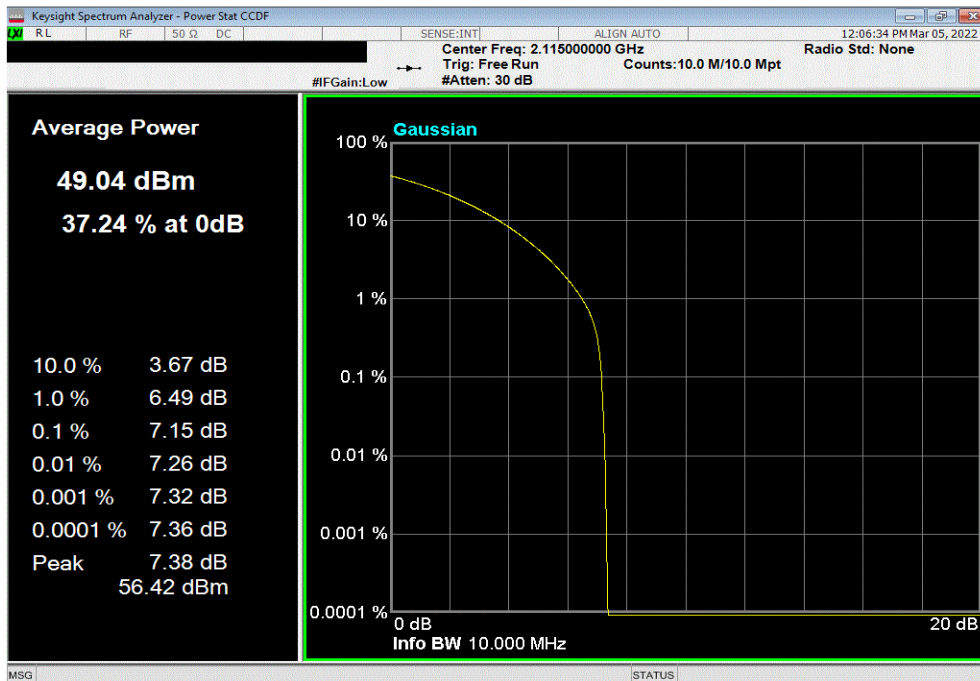


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 5 MHz Bandwidth, E-TM1.1 with N-TM, High Channel, 2197.5 MHz						
		PAPR Value (dB)	PAPR Limit (dB)	Results		
		7.06	13	Pass		



Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 10 MHz Bandwidth, E-TM1.1 with N-TM, Low Channel, 2115 MHz						
		PAPR Value (dB)	PAPR Limit (dB)	Results		
		7.15	13	Pass		

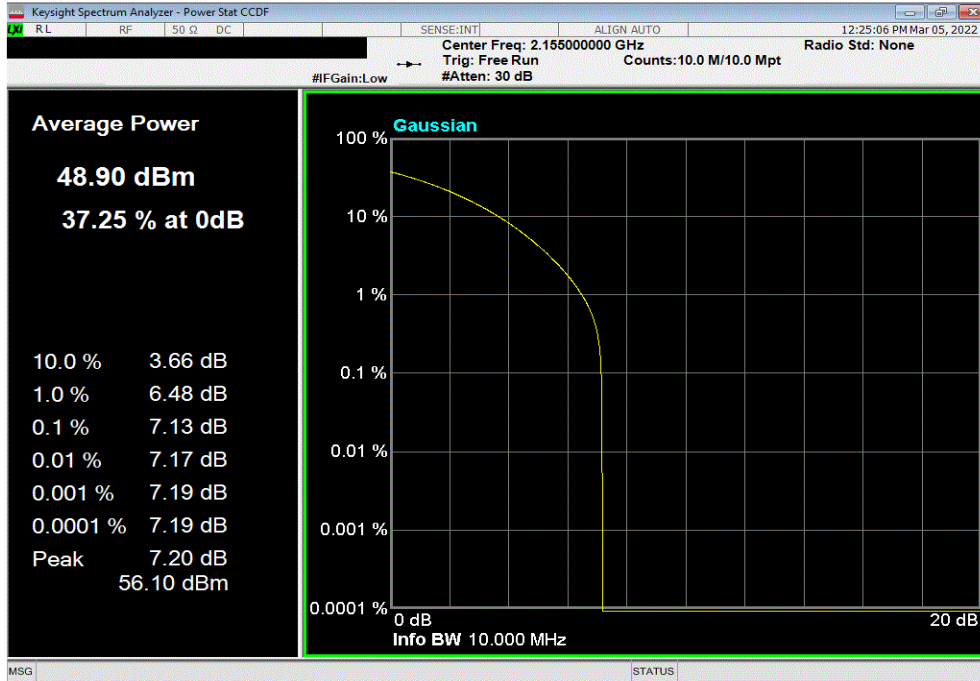


# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND

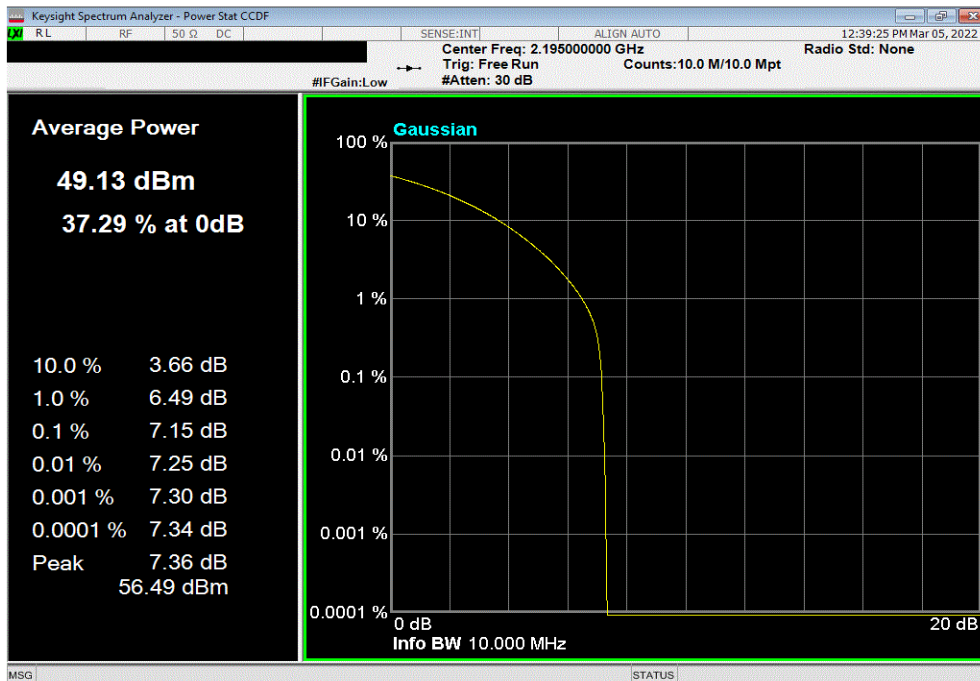


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 10 MHz Bandwidth, E-TM1.1 with N-TM, Mid Channel, 2155 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.13	13	Pass			



Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 10 MHz Bandwidth, E-TM1.1 with N-TM, High Channel, 2195 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.15	13	Pass			

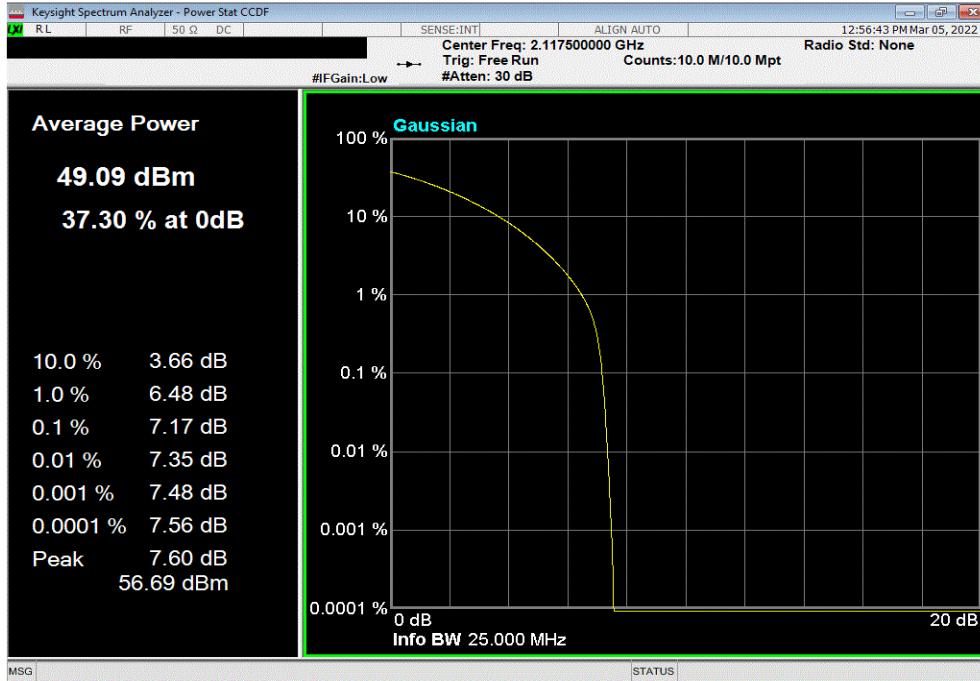


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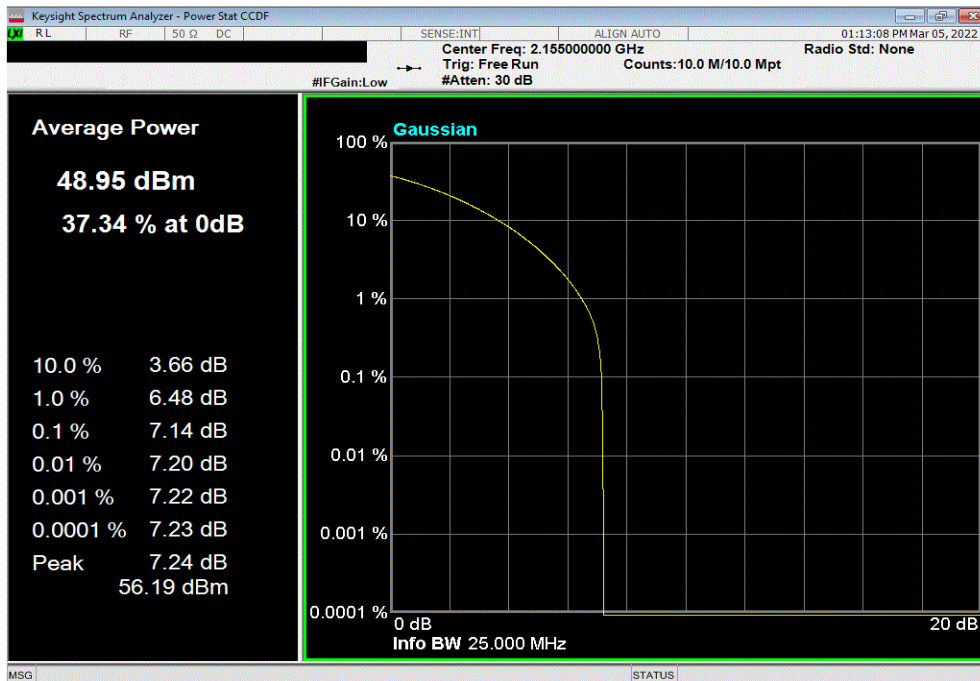


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 15 MHz Bandwidth, E-TM1.1 with N-TM, Low Channel, 2117.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.17	13	Pass			



Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 15 MHz Bandwidth, E-TM1.1 with N-TM, Mid Channel, 2155 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.14	13	Pass			

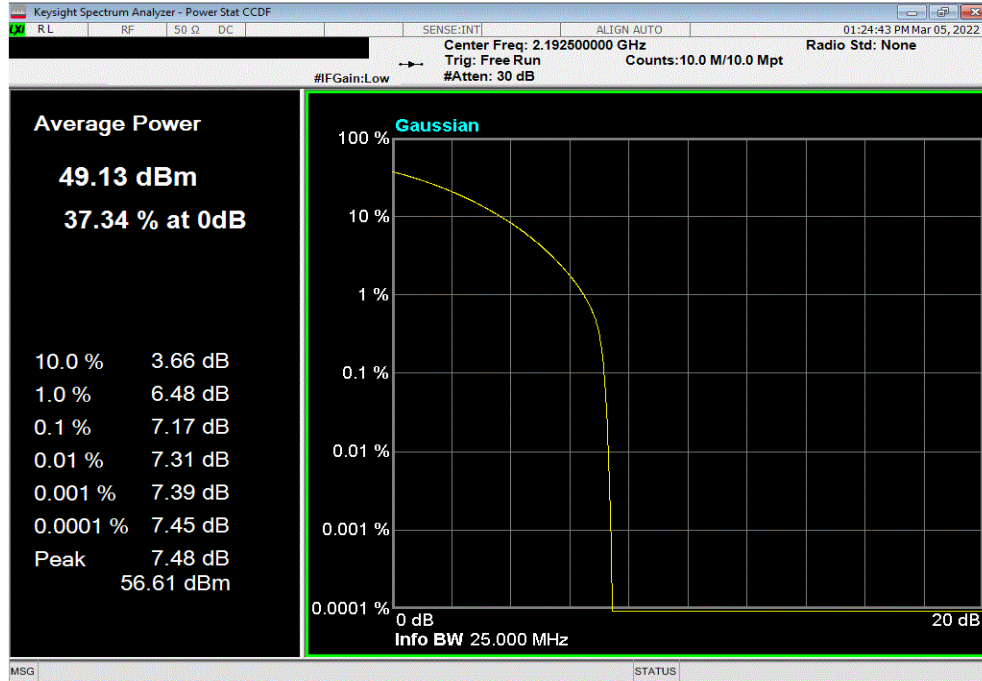


# PEAK TO AVERAGE POWER (PAPR) CCDF - IN-BAND

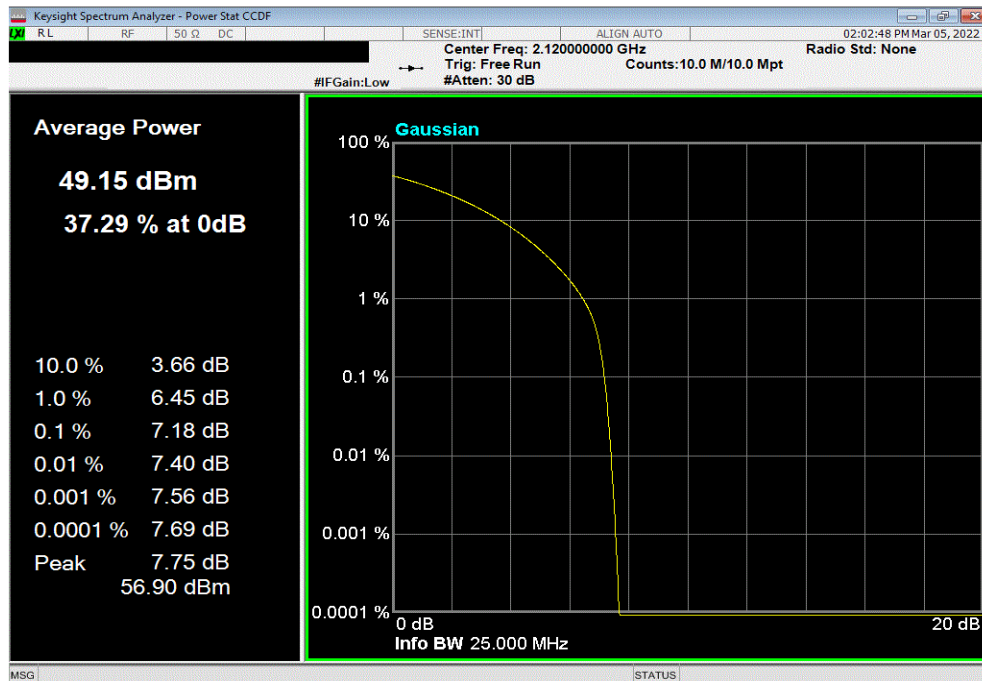


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 15 MHz Bandwidth, E-TM1.1 with N-TM, High Channel, 2192.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.17	13	Pass			



Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 20 MHz Bandwidth, E-TM1.1 with N-TM, Low Channel, 2120 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.18	13	Pass			

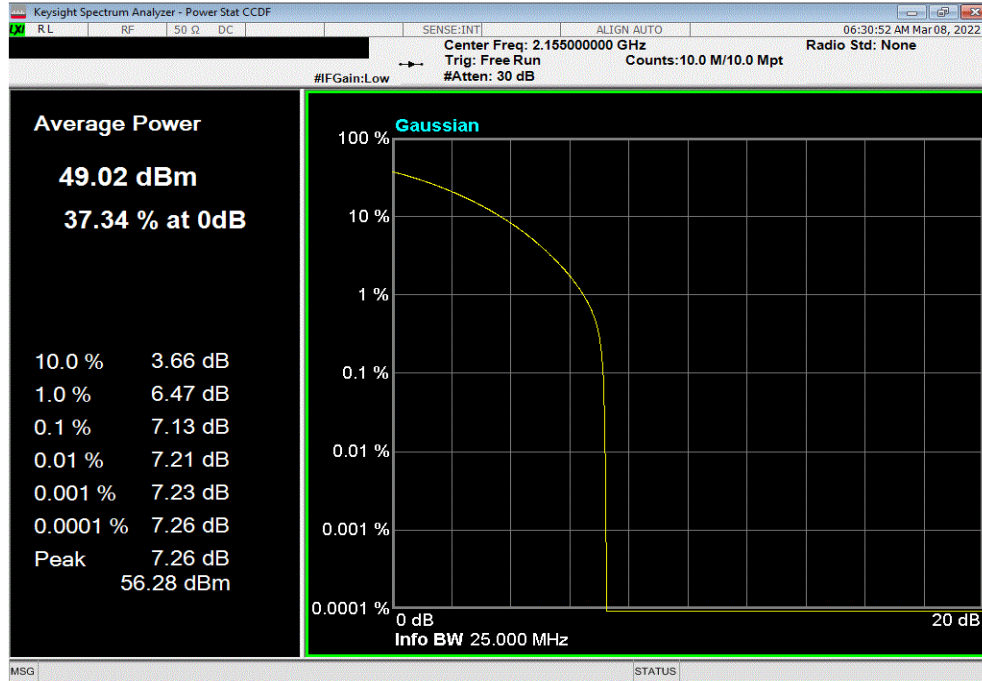


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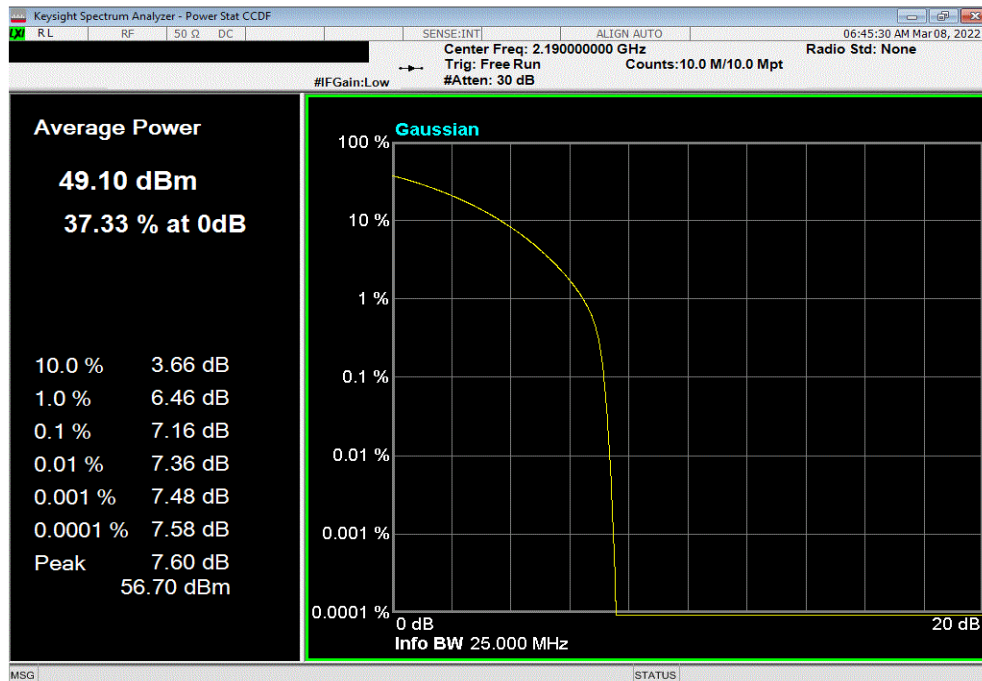


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 20 MHz Bandwidth, E-TM1.1 with N-TM, Mid Channel, 2155 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.13	13	Pass			



Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT In Band, Port 1, 20 MHz Bandwidth, E-TM1.1 with N-TM, High Channel, 2190 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.16	13	Pass			



# PEAK TO AVERAGE POWER (PAPR) CCDF - STAND ALONE



XMit 2022.02.07.0

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Block - DC	Fairview Microwave	SD3379	AMT	2021-09-14	2022-09-14
Receiver	Rohde & Schwarz	ESR26	ARQ	2021-05-11	2022-05-11

## TEST DESCRIPTION

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Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum of the average spectrum does not exceed the rule part defined limit.

The PAPR measurement method is described in ANSI C63.26 section 5.2.3.4.  
The PAPR was measured using the CCDF function of the spectrum analyzer.

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Per FCC part 27.50(d)(5), RSS-139 6.5, and RSS-170 5.3.1, the peak-to-average power ratio (PAPR) shall not exceed 13dB.


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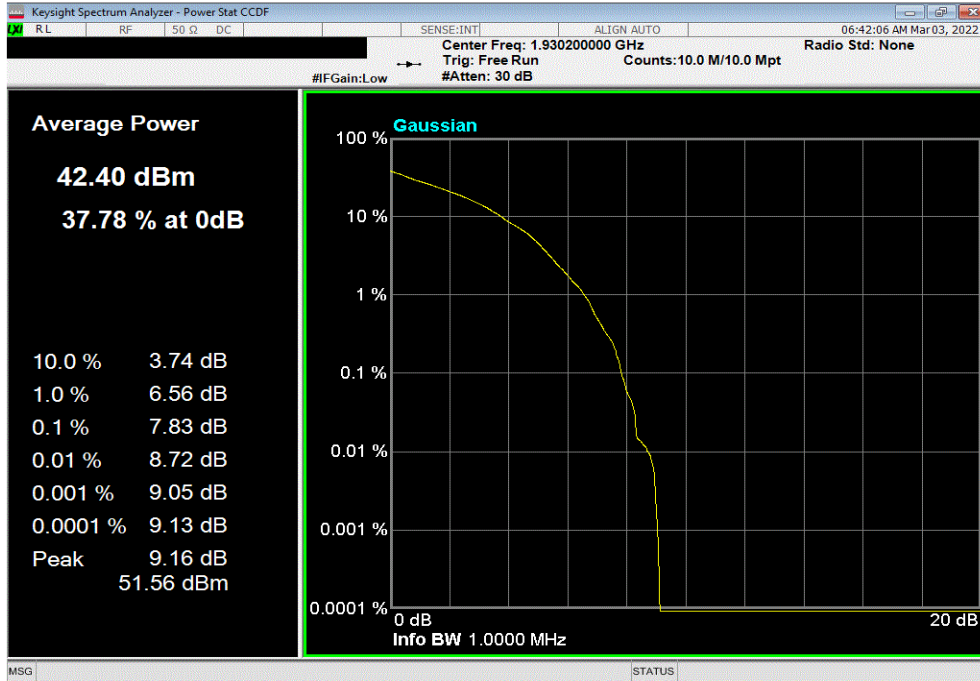
EUT: AHFII Remote Radio Head		Work Order: NOKI0037
Serial Number: YK214000036		Date: 28-Feb-22
Customer: Nokia Solutions and Networks		Temperature: 22.6 °C
Attendees: David Le, John Rattanaovong		Humidity: 23.7% RH
Project: None		Barometric Pres.: 1026 mbar
Tested by: Mark Baytan	Power: 54 VDC	Job Site: TX09
TEST SPECIFICATIONS		
FCC 24E:2022		Test Method: ANSI C63.26:2015
RSS-133 Issue 6:2013+A1:2018		RSS-133 Issue 6:2013+A1:2018
COMMENTS		
All measurement path losses accounted for in the reference level offset including any attenuators, filters, and DC blocks. The Band 25 NB IoT Standalone carrier was enabled at maximum power of 20 watts/carrier.		
DEVIATIONS FROM TEST STANDARD		
None		
Configuration #	2	Signature 
		PAPR Value (dB)      PAPR Limit (dB)      Results
Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT Stand Alone		
Port 1		
200 kHz Bandwidth		
N-TM		
Low Channel, 1930.2 MHz	7.83	13      Pass
Mid Channel, 1962.5 MHz	7.84	13      Pass
High Channel, 1994.8 MHz	7.84	13      Pass

# PEAK TO AVERAGE POWER (PAPR) CCDF - STAND ALONE

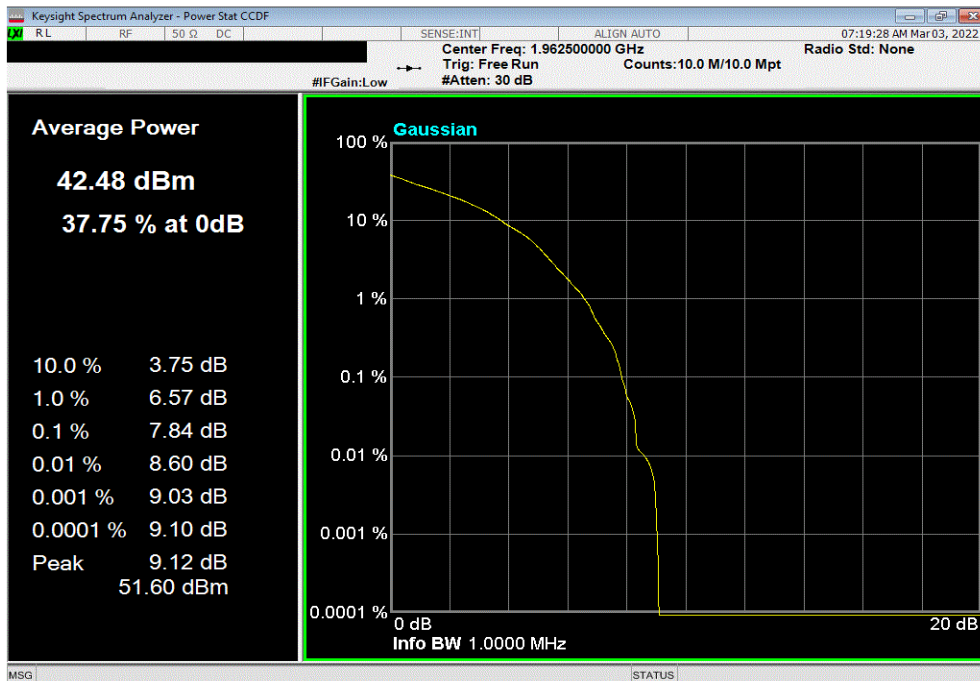


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT Stand Alone, Port 1, 200 kHz Bandwidth, N-TM, Low Channel, 1930.2 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.83	13	Pass			



Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT Stand Alone, Port 1, 200 kHz Bandwidth, N-TM, Mid Channel, 1962.5 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.84	13	Pass			

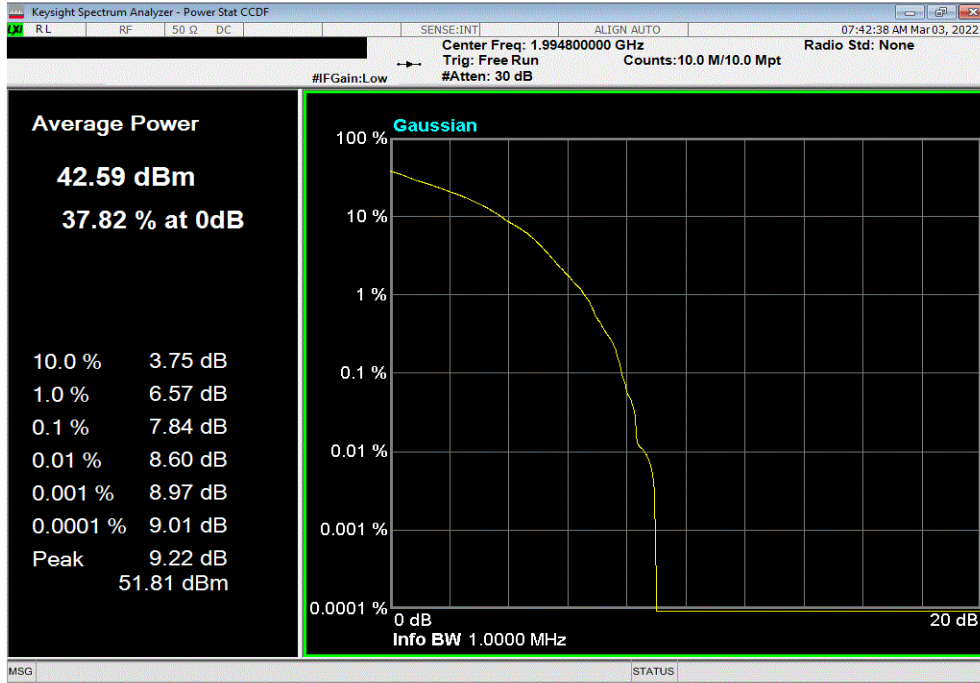


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TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 25, 1930 MHz - 1995 MHz, LTE Narrow Band IoT Stand Alone, Port 1, 200 kHz Bandwidth, N-TM, High Channel, 1994.8 MHz						
		PAPR Value (dB)	PAPR Limit (dB)	Results		
		7.84	13	Pass		



# PEAK TO AVERAGE POWER (PAPR) CCDF - STAND ALONE



Tel: 2021.12.14.1 XMit: 2022.02.07.0

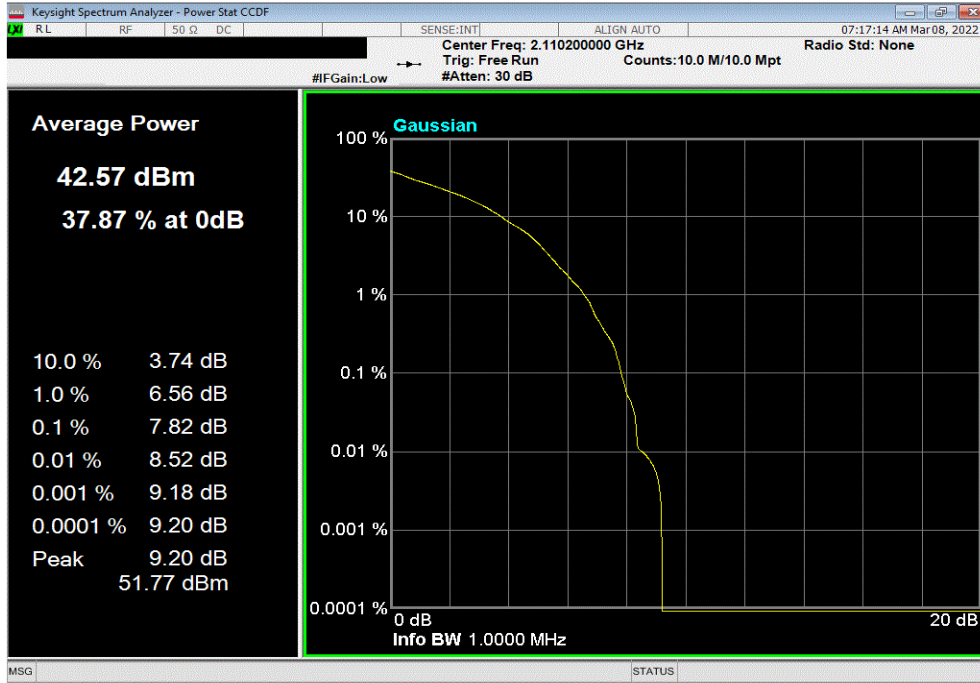
EUT: AHFII Remote Radio Head		Work Order: NOKI0037	
Serial Number: YK214000036		Date: 28-Feb-22	
Customer: Nokia Solutions and Networks		Temperature: 22.6 °C	
Attendees: David Le, John Rattanavong		Humidity: 23.7% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Mark Baytan	Power: 54 VDC	Job Site: TX09	
<b>TEST SPECIFICATIONS</b>			
FCC 27:2022		Test Method	
RSS-139 Issue 3:2015		ANSI C63.26:2015	
RSS-170 Issue 3:2015		RSS-139 Issue 3:2015	
		RSS-170 Issue 3:2015	
<b>COMMENTS</b>			
All measurement path losses accounted for in the reference level offset including any attenuators, filters, and DC blocks. The Band 66 NB IoT Standalone carrier was enabled at maximum power of 20 watts/carrier.			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	2	Signature	
		PAPR Value (dB)	PAPR Limit (dB) Results
Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT Stand Alone			
Port 1			
200 kHz Bandwidth			
N-TM			
Low Channel, 2110.2 MHz		7.82	13 Pass
Mid Channel, 2155 MHz		7.83	13 Pass
High Channel, 2199.8 MHz		7.85	13 Pass

# PEAK TO AVERAGE POWER (PAPR) CCDF - STAND ALONE

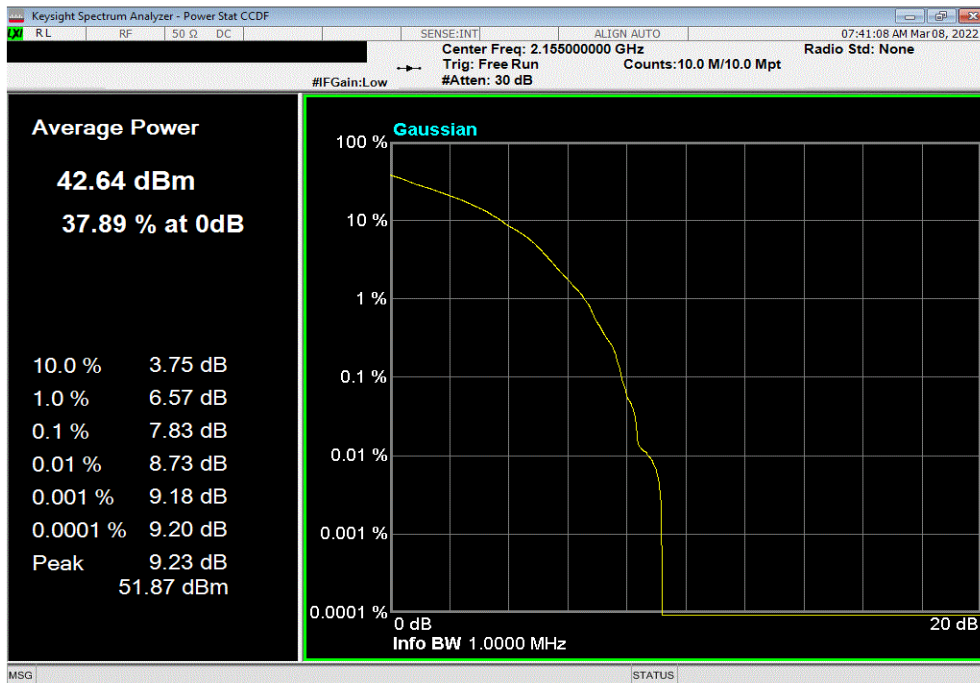


TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT Stand Alone, Port 1, 200 kHz Bandwidth, N-TM, Low Channel, 2110.2 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.82	13	Pass			



Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT Stand Alone, Port 1, 200 kHz Bandwidth, N-TM, Mid Channel, 2155 MHz						
	PAPR Value (dB)	PAPR Limit (dB)	Results			
	7.83	13	Pass			



# PEAK TO AVERAGE POWER (PAPR) CCDF - STAND ALONE



TbTx 2021.12.14.1 XMI 2022.02.07.0

Band 66, 2110 MHz - 2200 MHz, LTE Narrow Band IoT Stand Alone, Port 1, 200 kHz Bandwidth, N-TM, High Channel, 2199.8 MHz						
		PAPR Value (dB)	PAPR Limit (dB)	Results		
		7.85	13	Pass		

